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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/014,407	12/14/2001	Minoru Suzuki	011622	9744

23850 7590 12/04/2002

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EXAMINER
SOWARD, IDA M

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 12/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/014,407	Applicant(s) SUZUKI ET AL.	
	Examiner Ida M Soward	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover she t with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 September 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☒ Claim(s) *3 and 5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 December 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

This Office Action is in response to the Applicants' amendment filed September 16, 2002.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: **35a** and **35b** in Figure 5c-5d and 6. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

Claims 3 and 5 are objected to because of the following informalities: **the** should have been after "**on**" in lines 20 and 2, respectively. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear as to how the first and second base layers are positioned on one side surface and the other side surface of the semiconductor substrate so as to form PN planar junctions with the first and second buried layers along the first and second base layers and the first and second buried layers.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 and 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Takizawa (5,962,878).

As best understood, Takizawa teaches a semiconductor device having, when one of wither an N-type or P-type is defined as a first conductivity type, and the other is provided as a second conductivity type, a semiconductor substrate **2** of the first conductivity type, the semiconductor device comprising: first and second buried layers

46 provided within the semiconductor substrate, being of the first conductivity type, and being of a higher concentration than the semiconductor substrate; first and second emitter layers **18** of the first conductivity type; first and second base layers **20** of the second conductivity type; and a substrate layer is sandwiched between the first and second buried layers, wherein the first and second base layers are positioned on one side surface and the other side surface of the semiconductor substrate so as to form PN planar junctions with the first and second buried layers along the first and second base layers and the first and second buried layers, wherein the first and second emitter layers are located in a vicinity of a surface of inside of the first and second base layers so as to form PN junctions with the first and second base layers, wherein at least a part of the first and second base layers are respectively provided between the first and second emitter layers and the first and second buried layers, and wherein at least a part of the first and second buried layers are located between the first and second base layers and the substrate layer (Figure 1, cols. 9-10, lines 53-67 and 1-55, respectively).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa (5,962,878) in view of Ohta (5,352,905).

Takizawa teaches all mentioned in the rejection above. However, Takizawa fails to teach emitter and base layers being electrically short-circuited by metal films. Ohta teaches a first metal film T_1 formed on one side of the semiconductor substrate **P**, and a second metal film T_2 formed on the other side of the semiconductor substrate, and the first emitter layer P_1 and the first base layer N_1 being electrically short-circuited by the first metal film, and the second emitter layer P_2 and the second base layer N_2 being electrically short-circuited by the second metal film (Figure 1B, cols. 4-6, lines 49-68, 1-68 and 1-41, respectively). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the surge protection device of Takizawa with the metal films of Ohta to provide a semiconductor surge suppressor having improved breaking and surge operation performances.

Claims 3, 6, 10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa (5,962,878) and Ohta (5,352,905) as applied to claim 2 above, and further in view of Assour et al. (4,292,646).

Takizawa and Ohta teach all mentioned in the rejection above. Takizawa further teaches first and second moats **16** with bottom surfaces reaching the buried layers formed on both sides of the semiconductor substrate and reaching positions deeper than the bottom surfaces of the base layers, wherein the first and second emitter layers are located inside of the first and second moats; at least a part of the first and second buried layers positioned at a region on the outside of the first and second moats of the surfaces of the semiconductor substrate; and a step of forming moats including the first

and second emitter layers inside of the moats on both sides of the semiconductor substrate (Figure 1). However, Takizawa and Ohta fail to teach ring-shaped moats. Assour et al. teach a ring-shaped moat **69** (Figure 2, col. 4, lines 9-15). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the surge protection device of Takizawa and the metal films of Ohta with the ring-shaped moat of Assour et al. to provide lateral isolation from the adjacent region.

Claims 4, 11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa (5,962,878), Ohta (5,352,905) and Assour et al. (4,292,646) as applied to claims 2-3 above, and further in view of Planey (3,772,577).

Takizawa, Ohta and Assour et al. teach all mentioned in the rejection above. However, Takizawa, Ohta and Assour et al. fail to teach moats filled with oxide. Planey teaches moats **12** filed with oxide (Figure 3 col. 2, lines 30-51). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the surge protection device of Takizawa and the metal films of Ohta and the ring-shaped moat of Assour et al. with the oxide filled moats of Planey to reduce junction.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa (5,962,878), Ohta (5,352,905) and Assour et al. (4,292,646) as applied to claims 2-3 above, and further in view of Casey et al. (US 6,448,589 B1).

Takizawa, Ohta and Assour et al. teach all mentioned in the rejection above. However, Takizawa, Ohta and Assour et al. fail to teach at least part of the base layers **48** & **49** positioned at a region on the outside of the moats **76** & **79** of the surface of the semiconductor substrate **42** & **66** (Figure 2, col. 4-6, all lines). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the surge protection device of Takizawa and the metal films of Ohta and the ring-shaped moat of Assour et al. with the positioning of the base layers of Casey et al. to provide sufficient thermal migration into the semiconductor material.

Response to Arguments

Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respects to surge protection devices:

Chen et al. (4,800,420)

Hayashi et al. (5,371,385)

Hayashi et al. (5,376,809)

Hayashi et al. (5,486,709)

Misawa et al. (4,484,214)

Saitou (5,343,065).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M Soward whose telephone number is 703-305-3308. The examiner can normally be reached on Monday - Thursday, 6:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ims
November 20, 2002

AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800